

What is claimed is:

1. A friction agitation welding apparatus for forming a weld across a joint between superposed plate workpieces by rotating a friction agitation welding tool about an axis of welding while urging the friction agitation welding tool and the superposed plate workpieces together in an axial direction of welding whereby generating frictional heat to create a plasticized region in a workpiece material around the friction agitation welding tool and allowing the plasticized workpiece material to solidify to form a weld across said joint, said friction agitation welding apparatus comprising:

- a base support;

- a threaded shaft rotatably mounted to said base support;

- a first drive source fixedly mounted on said base support to rotate said threaded shaft;

- an elevating member engaged with said threaded shaft to move along said threaded shaft resulting from rotation of said threaded shaft so as thereby to urge the friction agitation welding tool and the superposed plate workpieces together in the axial direction of welding;

- a first drive shaft mounted to said elevating member, rotatably about the axis of welding but fixedly in movement in the axial direction of welding, and mounting friction agitation welding tool to a distal end thereof;

- a second drive shaft mounted coaxially with said first drive shaft, fixedly in rotation relative to said first drive shaft but movably in an axial direction of said first drive shaft; and

- a second drive source fixedly mounted on said base support to rotate said second drive

shaft.

2. A friction agitation welding apparatus as defined in claim 1, wherein said elevating member comprises a cylindrical casing enclosing said first drive shaft therein and extending near said distal end of said first drive shaft, said cylindrical casing being mounted for axial movement to said base support through a bearing at a tip end opposite to said distal end.

3. A friction agitation welding apparatus as defined in claim 1, and further comprising a back-up tool fixedly mounted in aligned with and spaced apart from the friction agitation welding tool to said base support so as to support the superposed plate workpiece at a side remote from the friction agitation welding tool.

4. A friction agitation welding apparatus as defined in claim 3, wherein said friction agitation welding apparatus is adapted to be detachably installed to a robot.